

position. In the other hand, if the button cover 12 is freed at a position between the second and the third position, it rotates toward the second position.

FIG. 7 shows a first member 80 and a second member 82 of the hinge in accordance with a further alternative embodiment of the present invention. The body and the shaft of the first member 80 is similar to those of the first member 26 described in the above. The first member 80 has a cylindrical guide column 84 which is projected from the body and extended along the rotating axis. The first member 80 has opposing square protrusions 86 defining a cam follower. Each protrusion 86 extends axially and is diametrically positioned around the cylindrical guide column 84. Each protrusion 86 has an end 88. The shape of the intersection line of the end 88 and a plane parallel to the axis 54 is semicircular. This configuration offers line contact between the end 88 of the first member 80 and the cam surface of the second member 82. Although the protrusions 86 is shown to be integrated with the guide column 84 in FIG. 7, the protrusions 86 may be spaced from the guide column 84.

The body and the cam portion of the second member 82 are similar to those of the second member 28 described in the above embodiment. The second member 82 has a guide groove or hole 92. The guide column 84 is slidably inserted into the guide hole 92. The guide column 84 and the guide hole 92 guide the relative motion between the cam surface and the cam follower.

Referring to FIG. 8, in a further alternative embodiment of the present invention, the first member of the present invention has an elongated, cylindrical guide pin 94 and the second member has a guide column or boss 98 as in the second member shown in FIG. 3. A guide hole 96 is formed on the boss. The guide pin 94 and the guide hole 96 extend axially. The guide pin 94 is slidably inserted into the guide hole 96. The guide pin 94 and the guide hole 96 ensure the good guidance of the relative motion between the first and second members and prevent the second member from being slanted.

Although the present invention is described in detail referring to the above embodiments, the present invention is not limited to the above embodiments.

Although the can is described to have octagonal shape in the above embodiment, the can may have circular or rectangular shape. Then the body of the second member may have a shape corresponding to the can.

The slope angles of the portions of the cam surface which connect the peaks and the valleys are described to be same in the above embodiments. However, the angles of the surfaces connecting one of the peaks with two opposing valleys may vary. In this case, a line connecting the opposing peaks and a line connecting the opposing valleys are not perpendicular to each other.

Although it is explained that the first member have a cam follower and the second member has a cam portion in the above embodiment, the first member may have a cam surface and the second member may have a cam follower.

The can may be constructed of a thermoplastic resin and a cap may be provided to cover the opened end of the can.

The can may be configured to have a body of thermoplastic resin and a pair of retaining protrusions of metal by way of the insert molding.

Although the invention has been shown and described with respect to the exemplary embodiments, it should be understood that various changes, modifications and additions may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A hinge comprising:

a single piece can having a hollow can wall, a first end, and a second end opposing the first end, the second end being at least partially closed with at least one extension of the can wall extending from the second end perpendicularly to the hollow can wall;

a first member contained within the can and having a coupler end exposed to the outside of the can from the first end;

a second member contained within the can, the second member opposing the first member;

one of the first member and the second member having a cam, the other of the first member and second member having a cam follower interacting with the cam so that the first member rotates about an axis and the second member moves linearly along the axis when the cam follower follows the cam; and

a resilient member contained within the can, urging the second member toward the first member.

2. The hinge of claim 1, wherein the cam follower has two protrusions diametrically positioned and extending toward the cam, and the cam has two diametrically positioned peaks and two diametrically positioned valleys.

3. The hinge of claim 2, wherein each protrusion has a hemispherical end.

4. The hinge of claim 1, wherein one of the first and second members has a guide column extending along the axis and the other of the first and second members has a guide hole provided along the axis, wherein the guide hole is configured to receive the guide column, whereby the first member can rotate about and the second member moves along the axis.

5. The hinge of claim 1, wherein the at least one extension comprises two opposingly positioned extensions, wherein the two extensions are bent toward each other.

6. The hinge of claim 1, wherein the at least one extension is bent to at least partially close the second end.

7. An apparatus, comprising:

a first member rotatable about an axis;

a second member located next to the first member, the second member linearly movable along the axis;

a resilient member locating next to the second member and exerting force on the second member to make the first member and the second member contact each other;

a housing enclosing the first member, the second member, and the resilient member along the axis; and

a bendable wall attached to the housing, the bendable wall at least partially closing the housing, the bendable wall being configured to be bent relative to the housing, whereby enabling opening or closure of the housing;

wherein the first member and the second member are configured such that:

rotation of the first member up to an angle in a rotational direction about the axis causes movement of the second member in a first linear direction along the axis;

rotation of the first member beyond the angle in the same angular direction about the axis causes movement of the second member in a second linear direction opposite the first linear direction by the force of the resilient member; and

this movement of the second member in the second linear direction causes further rotation of the first member in the same angular direction about the axis.